

GENERAL REFERENCE ON RECYCLING EQUIPMENT

2013-2014 KY Pride Fund Grant

This guide is not intended to be a complete reference about all things recycling, but to provide a general idea on the capabilities and appropriateness on the types of recycling equipment we most commonly encounter in recycling grant applications. The cost of steel and aluminum greatly affect prices for most of this equipment as do transportation costs in delivering them to the final destination.

The types of recycling equipment listed can be purchased through the state e-procurement site as a convenience for the applicant. The site can be viewed at:

<http://finance.ky.gov/services/eprocurement/Pages/RecyclingContainersandEquipment.aspx>

LOADERS

- Skid steer loaders of the type commonly called "Bobcats" are usually adequate for community recycling operations.
- Several manufacturers have suitable models such as Bobcat, Case, Mustang, John Deere, New Holland and Thomas to name a few.
- The loader is usually the "new clean diesel model" with rubber tires - normally comes with a bucket.
- Best attachments for recycling application:
 1. Grapple bucket - allows the loader to scoop loose material, such as paper, plastics, cardboard, etc., and clamp down on it to keep from losing the load
 2. Detachable forks so the loader can be used as a forklift as well.
- Lifting capacity should be at least 1,200 lbs.
- They should have about an 85 Horse Power engine.
- Used/rebuilt equipment from a reputable dealer with a minimum 6 month warranty is acceptable for this item.
- Approved vendors and equipment quote contacts are listed on the Finance Cabinet web site at:
<http://finance.ky.gov/services/eprocurement/Pages/RecyclingContainersand Equipment.aspx>
- Prices for new models range around \$25,000 - \$32,000 with grapple buckets costing an additional \$2,200 - \$3,000 and forks \$900 - \$1,200.
- Used models cost about \$15,000 - \$25,000.
- Enclosed cabs with heat and air conditioning and tracked models **ARE INELIGIBLE** for grant expenditure.

FORKLIFTS - for community recycling operations

- Propane powered models are preferred for indoor use, although the "new clean diesel" models are acceptable.
- Typical lift capacity needed in a community recycling operation is between 2,500 to 5,000 lbs.
- **Forklifts generally weigh twice what the lifting capacity is.**
- Should have pneumatic type tires = larger diameter than "cushion" type solid tires.
- Pneumatic tires generally safer to operate on rough floors and gravel lots.
- Pneumatic tires be filled with foam or have soft rubber cores to avoid recurring flat tires, common in recycling operations.
- Forks should not be less than 48" when new.
- New forklifts of the above capacity (2.5 K - 5 K) cost around \$18,000 - \$32,000.
- Toyota forklifts, built in Northern KY and Southern IN are in common use and have a good reputation for reliability. Clark, Doosan and Hyster are also reliable brands.
- The Division strongly recommends the purchase of NEW equipment. Used forklifts should be avoided unless accompanied by a 6 month minimum warranty from a reputable equipment dealer.

PALLET JACKS/TRUCKS - for community recycling operations

- Manually operated jacks are adequate.
- Electric powered models **ARE INELIGIBLE**.
- Manual jacks should have capacities of 4,000 - 5,500 lbs with 48" forks that are low enough to get under standard sized pallets.
- Have manually pumped hydraulics that lift the pallet off of the floor & are pushed/pulled by hand.
- A foot pedal is used to lower the load back to the floor.
- Jacks/trucks cost anywhere from \$300 to \$1,200 depending on capacity and features.
- Jacks in the \$500 range are usually adequate.

DOWN STROKE (VERTICAL) BALERS

- Bales = 60" long X 42" - 48" wide X 42" - 48" deep, weighing about 800 - 1000 + lbs. (for cardboard).
- Those making smaller sized bales (36" - 48") are not "Mill Standard" and are not acceptable to most end users.
- Those making larger bales (72") are unnecessary and the bales produced are usually unwieldy and sloppy to handle.
- Is sufficient for smaller community recycling operations that makes no more than 8 - 10 bales of materials per day. Generally requires 3-phase 220 Volt AC electricity, with a 20 Amps disconnect box to operate.

- Preferred models have "long cylinder rods" that come to within 6" of the floor of the baler when fully extended.
- Used to bale cardboard, shredded office paper, plastic containers, steel cans, aluminum cans, vinyl siding, sheet metal, and other materials that have "spring back" to allow strapping with baling wire.
- Not the preferred one to bale other materials with little compressibility such as: newspaper; whole sheets of office paper or mixed paper that require steel strapping to tie them. Most paper mills and plastics regrinders do not like steel strapping on baled materials they buy.
- New down stroke balers cost around \$11,000 to \$17,000, plus freight and installation.
- Used/rebuilt balers are acceptable as long as they come from a reputable equipment dealer with a minimum 6 month warranty.
- Baling wire usually needed is 13 to 12 gauge X 14 ft. long loop end, with galvanized wire being preferred. These balers usually come with hydraulic oil included.
- The Division strongly recommends the purchase of NEW equipment. Used/rebuilt can usually be bought for 3/4 to 2/3 of new price.

HORIZONTAL BALERS

- Horizontal is the most efficient production; should make bales 60" -72" long.
- Other dimensions vary from model to model, but bales of cardboard should weigh 1,200 - 2,000 lbs. plus. The 60" horizontal balers are the minimum mill size that are acceptable, and do allow for more materials to be properly baled (i.e. Newspaper, whole sheets of office paper) that down stroke balers do not adequately handle.
- This style of bale is preferred by end users as they are consistent in weight and density and are readily stackable in their warehouses.
- Most of these types of balers eject the finished bale out the end.
- Some eject from the side which is preferable in tight spaces.
- Manual tie balers are all that are necessary at the community recycling level.
- The state recycling program produces on average 120 tons of paper and cardboard per month using manual ties horizontal balers.
- "Auto-Tie" balers add \$10,000 - \$20,000 to the cost of a horizontal baler and is necessary only for community operations that produce an exceptionally large volume of material on a daily basis.
- "Wide mouth" balers are preferred to accommodate large sheets of cardboard.
- **Shear bars in the hopper area are also necessary** to be able to efficiently process cardboard without jamming.
- New horizontal balers cost between \$70,000 - \$110,000 depending on features and capacity.

- Side eject models run on the high side with smaller end eject models running toward the low end.
- This is another case where used/rebuilt equipment is acceptable as long as they come from reputable dealers and a minimum 6 month warranty.
- These bales are also tied with loop end bale ties usually 12 or 11 gauge wire X 18 to 22 ft. long, depending on model.
- This type on baler can be quoted with or without the necessary hydraulic oil.
- Ask for price quotes to include delivery and installation costs.
- Horizontal balers should include a feed conveyor to take advantage of the increased efficiency that such balers are capable of.

CONVEYORS

- Conveyors are used to feed materials to horizontal balers or to sort material before it is baled.
- The rubber belt type of conveyor is the preferred type and is most commonly used for recycling; it is also the most cost efficient.
- Conveyors used to feed balers are usually inclined and require ceiling heights in recycling operation of 14 - 18 ft., depending on the height of the hopper of the baler being fed.
- They also have hoppers at the base, and can be pit, or floor mounted.
- Rubber or angle iron "cleats" or "risers" mounted on the belt move the material up the belt into the baler hopper.
- Feed conveyors should be wide enough to accommodate large sheets of cardboard.
- Sorting conveyors, if separate from feed conveyors, are usually horizontal for accessibility and safety of the people sorting.
- Sorting conveyors should not be more than 3 ft. wide requiring sorters to reach no more than 18 inches from either side.
- Horizontal sorting conveyors usually do not have cleats on them.
- Sorting stations for elevated conveyors require railings to prevent personnel from falling and should include access by steps (stairs - OSHA preferred) rather than ladders.
- All conveyors must have emergency stop switches to meet OSHA safety standards, the most common one being the cable pull type that can be activated all along the length of a conveyor.
- Conveyors can run on either single or 3 phase electric power.
- Conveyors costs vary by size and function.
- Typical feed conveyors cost about \$15,000 - \$35,000.
- Sorting conveyors cost about \$30,000 - \$100,000, depending on length and number of sorting stations.

RECYCLING TRAILERS

- Recycling trailers are those that are designed specifically for the collection of recyclable materials only.
- They always have a roof and side access doors or slots to deposit recyclables.
- They may or may not be compartmentalized.
- Most of the ones appropriate for community recycling operations can be pulled by a heavy pick up truck.
- They must have tail lights and should have brakes of some sort.
- Size varies with cost from 12 cubic yards to 20+ cubic yards.
- The smaller ones cost about \$10,000 and the larger capacity ones costing around \$22,000.
- Ask for price quotes to include shipping/freight costs.
- Pro-tainer, Kentucky Recycling Trailers and Metal Works 360 are several trailer/container fabricators who are competitive in price and quality who build to order.

SCALES

- Basic recycling center scales consist of a steel platform about 4 ft. X 4 ft. to 5 ft. X 5 ft connected to a digital read out display
- Some include a ticket printer as well
- Weighing capacity between 3,000 - 5,000 lbs., with 2 lb. increments, is usually adequate for community recycling operation needs.
- This item is best bought new with professional installation involved.
- Regular calibration should be done to insure accuracy of weights.
- A metal guard of some sort should usually be installed, either locally fabricated or part of the quote to protect the scale from being struck by forklifts.
- Costs are about \$1,500 - \$3,500 depending on weight capacity.

BARRIER BLOCKS

- These concrete blocks are about 5 ft. long X 2 - 3 ft. wide X 3 ft. tall, weigh 2,000 - 2,200 lbs, and have grooves, holes, tabs and/or lifting rings to tie them together when stacked.
- The blocks are used to make bunkers for bulk materials such as paper, cardboard, plastic containers, glass, steel cans, scrap metals, appliances, etc.
- The weight of the blocks and the way they are stacked in an interlocked manner (like Lego's) keeps them from being pushed over or around by the material contained.
- The blocks can be purchased from many regional IMI cement dealers, or local dealers.

- The cost is anywhere from \$25.00 - \$45.00 per block delivered in tractor/trailer load lots.

ROLL OFF CONTAINER SYSTEM

- Pro-Tainer produces a system that can be used much as a larger roll off truck for hauling compartmented recycling containers.
- No other vendor manufactures such a system that DWM staff is aware of. The trailer can be hauled by a heavy pick up truck and has a set of rails, and a gasoline engine which powers a hydraulic pump that tilts the rails and winches the containers off and onto the trailer.
- The trailer has brakes and lights.
- The containers are usually 6 compartmented, 12 cubic yards, with side loading doors.
- Materials are discharged from the rear with commodities separated by the interior dividers.
- Cost of a trailer is about \$ 14,000 - \$18,000 depending on capacity. .
- Cost of the 12 cubic yard compartmented trailer is about \$5,000 - \$7,000.
- Ask for price quotes to include delivery charges.

DOCK PLATES

- Dock plates are no more than steel or aluminum reinforced plates with "keeper tabs" to keep them in position between a dock floor and trailer or truck while forklifts run over them.
- They may also have chains or brackets that allow a forklift to pick them up.
- The load capacity of a dock plate must be sufficient to handle the weight of a forklift carrying a load across it into or out of a truck/trailer. I.e.: If a 5,000 lb. capacity forklift (which weighs 10,000) carries 2 bales of cardboard weighing 1,000 lbs. each then the plate must have a minimum capacity of the combined weights of the forklift and bales plus safety factor of 10% to be safe (13,200 lbs. total).
- A plate of 15,000 lbs. capacity would be sufficient, of course.
- Plates cost around \$1,000 - \$1,800 depending on capacity and if they are made from steel or aluminum.
- Plates should be not less than 72" wide X 36" long.
- Deck should be diamond plate for positive traction.

DOCK LEVELERS

- There are two types of levelers, the pit type and the dock edge type.

- The pit type requires a concrete lined rectangular, flat bottomed pit that the leveler fits in, inside the building at the loading door, while the dock edge leveler bolts to the edge of the dock at the loading dock door.
- These types of levelers are always made of steel.
- Pit type levelers can be manually lifted, spring loaded or electrically lifted.
- Edge levelers are always manually lifted.
- Both types should have hard rubber "dock bumpers" so trucks do not strike the leveler.
- As with dock plates, levelers must be of sufficient capacity to safely carry a forklift and its load of bales.
- Edge of dock levelers of 16,000 lbs capacity cost about \$1,200 - \$1,600 plus delivery.
- Pit type levelers of 25,000 to 30,000 lbs. capacity cost \$3,000 to \$6,000; concrete pit construction and delivery additional.

PORTABLE LOADING RAMPS

- These can substitute for regular truck docks in the sides of buildings.
- They are generally made of steel grating panels much like our "Singing Bridge" in Frankfort, to provide adequate traction for forklifts.
- Portable loading "Yard" ramps are generally 30 - 36 ft. long X 7 ft. wide and have side curbs to prevent forklifts from running off the sides.
- They usually have wheels that allow the ramp to be rolled in place to index and to lock into the rear of trucks or trailers.
- A hydraulic cylinder is used to pump the top end of the ramp to match the height of the truck or trailer being indexed to.
- A locking device is used to secure the ramp to the rear of the truck/trailer at the DOT bumper.
- Ramps of 16,000 to 20,000 lbs. capacity cost about \$10,000 to 18,000.

GAYLORD BOXES

- The "mule" of recycling, the Gaylord box is used to store/ship all types of recyclables, from glass containers to paper, plastic and non-ferrous scrap.
- Used Gaylords are perfectly acceptable for recycling. New unused Gaylords are much more expensive.
- Gaylords should be "triple wall" corrugated, free of tears and holes, standing about 42" tall X 40 - 42" wide on both sides.
- They normally fit well on standard sized 48" X 40" wooden pallets.
- Good Gaylords will hold up to 3,000 of recyclable material.
- They are usually shipped knocked flat and stacked and banded 20 - 25 per bundle.

- Used Gaylords cost about \$7.00 - \$9.00 each and are often discounted to the low end of the price range when purchased in trailer load lots of 200 - 400 boxes.
- Freight may be additional depending on delivery location.
- Gaylords can be purchased from used box dealers, commercial recyclers, and plastic molding companies that receive their resin pellets in Gaylords.
- Gaylords can usually be had for free from the market/broker a recycling program is working with, with the understanding that the boxes are returned to the supplier full of quality recyclable material.
- They are then "swapped" for empty ones.
- Gaylords that are no longer useable can be baled with other cardboard.

BANDING/STRAPPING KITS

- Banders are essential pieces of equipment for recycling operations.
- They can be used to restrap broken bales of materials, secure items stacked on pallets, keep a Gaylord box's seams from splitting and bundle up flattened Gaylords for shipping.
- Steel banding of 5/8 inch width X .020 thickness is all that is required for most recycling use. A steel clip is crimped on the banding once the band is tensioned around the bale, box or pallet to be strapped.
- A complete kit consisting of banding roll stand, tensioner, cutter and clip crimper costs about \$900 - \$1,500.
- Banding comes in 100 lbs. rolls and costs about \$250-\$3000 per roll.
- Clips cost about \$20 for a box of 200 or \$50 for 1,000 clips.
- Any recycling operation that processes and ships multiple commodities should have a bander.